Covenant of Mayors
in Sub-Saharan Africa

CoM SSA SEACAP Toolbox

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2.3: The Use of Proxy Data in Greenhouse Gas Inventories

This chapter is one component of the SEACAP Toolbox for the full Toolbox, please visit: https://comssa.org/

What you will learn in this chapter:

- Proxy data for GHG Inventories
- Assumptions used in development of the Proxy Data Tool spreadsheet
- Sources of proxy data
- How Proxy Data Tool works

This chapter has been designed for Local Government Officials and partners looking to compile a GHG Inventory for their region.

Covenant of Mayors in Sub-Saharan Africa

Calculating GHG emissions for an Inventory

Emissions (kg CO_2e) = Activity data x Emission factor x Global warming potential (kg CO_2e/kg greenhouse gas)

- Activity data
  - Level of activity that results in emissions occurring (e.g. fuel combusted, electricity consumed, tonnes of waste sent to landfill)
  - Area specific data
- Emission factors
  - Converts activity data to emissions of GHG
  - Published by many sources, including Intergovernmental Panel on Climate Change (IPCC)
- Global warming potential
  - Converts emissions of other GHGs to consistent unit
  - Published by IPCC

Proxy data for GHG Inventories

- Typically not all activity data for compilation of GHG Inventory is available
  - Unique data required for each emissions category
  - Sourcing activity data generally most challenging part of developing a GHG Inventory
- Where data is lacking, use can be made of available National, Regional and International data
  - Examples :
    - National fuel and electricity consumption
    - Regional (multiple-country and/or continental) waste and wastewater generation rates per capita
- In many cases the data needs to be downscaled to represent the sub-national region
  - Downscaling can be achieved using various factors, including:
    - Population
    - Economic (GDP)
    - Specific statistics (e.g. household sub-national cooking fuel statistics)

Assumptions used in development of Proxy Data Tool

- GHG Inventory developed to meet GPC BASIC level Inventory
  - Stationary energy
  - Transportation
  - Waste (including wastewater)
- All background data is from national and/or international data, which is downscaled as required
  - Downscaling all based on population and/or GDP depending on data inputs
- All waste and wastewater generated in the region is treated within the region
- Emission factors from IPCC 2006 Guidelines
- Global warming potentials from IPCC
  - Default is Second Assessment Report (AR2) to match National Inventories

Sources of proxy data

- Stationary energy
  - Fuel and electricity consumption per sector (National level)
    - African Energy Commission (AFREC)
  - Energy product (charcoal, coal, gas and oil) production (National level)
    - African Energy Commission (AFREC)
- Transportation
  - Fuel and electricity consumption (National level)
    - African Energy Commission (AFREC)
- Electricity grid emission factor
  - In-country generated electricity (National level)
    - African Energy Commission (AFREC)
  - Imported electricity (National level)
    - African Energy Commission (AFREC)
    - Regional Power Pool (CAPP, EAPP, NAPP, SAPP & WAPP) reports

Sources of proxy data

- Solid waste
  - Per capita generation rates (National level)
    - World Bank *What A Waste* data
  - Waste characterisation (Majority national level, with some based on sub-continental level)
    - World Bank *What A Waste* data
  - Waste treatment (Majority national level, with some based on sub-continental level)
    - World Bank *What A Waste* data
- Wastewater
  - Per capita generation rates (Continental level)
    - IPCC 2006 Guidelines
  - Wastewater treatment (Sub-continental level)
    - IPCC 2006 Guidelines

How the Proxy Data Tool works

- Proxy Data Tool is integrated into the CIRIS Tool developed by C40
- Minimum user inputs

INPUT DATA FOR GHG INVENTORY

	Units	Input value	Comment
Name of city	-	Test city	
Country	-	Algeria	Select from drop-down list
Inventory year	-	2018	Select from drop-down list
Geographic boundary	-	City / Municipality	Select from drop-down list
Land area within boundary	km^2		
Resident population within boundary	number	1,000,000	
GDP of economic activites within boundary	Current US$	100,000,000	If available
Assessment report	-	AR2	National Communications are based on Assessment Report 2 (AR2)

- Some data selected from drop down lists, remainder is inputted directly:
  - Regional area;
  - Population; and
  - If available, GDP

How the Proxy Data Tool works

- Users can then review all background data

Default data for review

This sheet summarises all National data used for downscaling calculations, as well as the downscaled regional values used within the GHG Inventory. Please utilise the expansion buttons (+ buttons) on the left hand side to expand data fields.

Users can change any National or Regional data if they have updated and/or better quality data, which will improve the quality of the GHG Inventory.

General information

	Units	Default value	User input value (if available)	% of national
Year	-	2018		
National population	Total number	42,228,429		
Regional population	Total number	1,000,000		2.4%
National GDP	Current US$	173,757,952,824		
Regional GDP	Current US$	100,000,000	100,000,000	0.1%

Any light blue cells allow users to input their own data if better/more up-to-date data is available

How the Proxy Data Tool works

	Units	National default value	User input national value (if available)	Downscaling factor	Regional default value	User input regional value (if available)
Residential buildings						
Petrol	1000 tonnes	0		Population	0	
Diesel	1000 tonnes	0		Population	0	
LPG	1000 tonnes	1,455		Population	34	
Natural gas	million m^3	9,069		Population	215	
Kerosene	1000 tonnes	0		Population	0	
Jet kerosene	1000 tonnes	0		Population	0	
Fuel oil	1000 tonnes	0		Population	0	
Low sulphur fuel oil	1000 tonnes	0		Population	0	
Other	1000 tonnes	0		Population	0	
Coal	1000 tonnes	0		Population	0	
Firewood	1000 tonnes	2		Population	0	
Biogas	TJ	0		Population	0	
Biomass residues	1000 tonnes	0		Population	0	
Charcoal	1000 tonnes	2		Population	0	
Other biomass	1000 tonnes	0		Population	0	
Electricity	MWh	22,511,248		Population	533,083	

- Users have ability to update both national (pre-downscaling) or regional data
- Certain sectors, such as residential energy, are always downscaled using population data

How the Proxy Data Tool works

	Units	National default value	User input national value (if available)	Downscaling factor	Regional default value	User input regional value (if available)
Manufacturing industries and construction						
Petrol	1000 tonnes	1		GDP	0	
Diesel	1000 tonnes	636		GDP	0	
LPG	1000 tonnes	52		GDP	0	
Natural gas	million m^3	4,696		GDP	3	
Kerosene	1000 tonnes	0		GDP	0	
Jet kerosene	1000 tonnes	20		GDP	0	
Fuel oil	1000 tonnes	0		GDP	0	
Low sulphur fuel oil	1000 tonnes	0		GDP	0	
Other	1000 tonnes	35		GDP	0	
Coal	1000 tonnes	59		GDP	0	
Firewood	1000 tonnes	0		GDP	0	
Biogas	TJ	0		GDP	0	
Biomass residues	1000 tonnes	0		GDP	0	
Charcoal	1000 tonnes	0		GDP	0	
Other biomass	1000 tonnes	0		GDP	0	
Electricity	MWh	20,418,202		GDP	11,751	

- Other sectors, such as Manufacturing Industries and Construction, can be downscaled using GDP if users can supply this data
  - If regional GDP is not available, population is used as the downscaling factor

How the Proxy Data Tool works

Waste

	Units	National default value	User input national value (if available)			
Solid waste						
Municipal solid waste generation rate	tonnes/capita.year	0.835				
Construction and demolition waste	tonnes/year	11,000,000		GDP	6,331	
Industrial waste	tonnes/year	2,547,000		GDP	1,466	
Medical/clinical waste	tonnes/year	30,000		Population	710	
Waste treatment						
Sanitary landfill	%	89%				
Controlled landfill	%	2%				
Unspecified landfill	%	0%				
Open dump	%	0%				
Anaerobic digestion	%	0%				
Composting	%	1%				
Incineration	%	0%				
Recycling	%	8%				
Other	%	0%				
Open burned	%					

- Waste and wastewater generation based on population and per capita generation rates

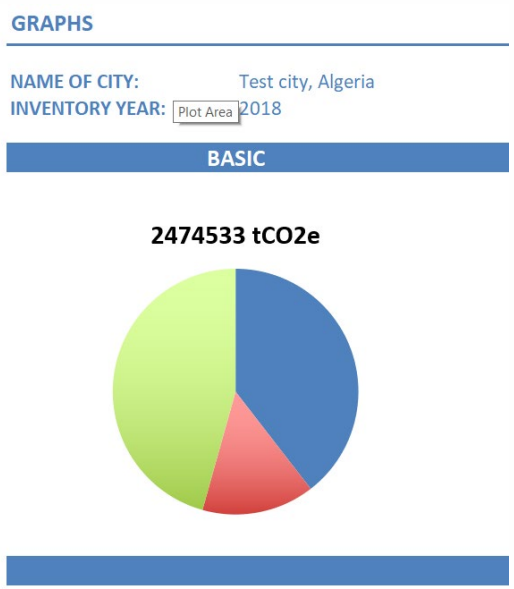
How the Proxy Data Tool works

- Default data and/or user inputted data carries forward into the remainder of the CIRIS Tool, which performs the emissions calculations
  - City information sheet
  - Stationary energy, Transportation and Waste sheets
    - Activity data
    - Calculated emissions
    - Method description
    - Data quality rating and comment
- Method description and data quality based on whether default values (i.e. downscaled from National data) or user inputted data
- Solid waste and wastewater calculations use the built-in CIRIS calculators

Proxy Data Tool results

Results presented in standard CIRIS Tool format

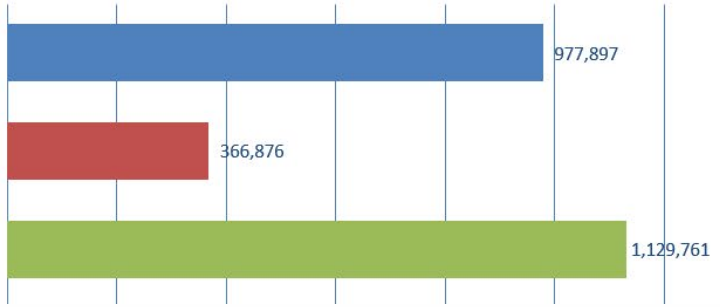
- In accordance with GPC methodology



SUMMARY

NAME OF CITY:	Test city, Algeria	POPULATION:	1,000,000
BOUNDARY:	BASIC	LAND AREA (km2):	
INVENTORY YEAR:	2018	GDP (US$ million):	100

tCO2e	BASIC	Scope 1	Scope 2	Scope 3
	Stationary	645,363	332,534	
	Transportation	350,689	16,186	
	Waste	1,129,761		



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The next chapter is the Introduction to the GPC

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